

SHORT REPORTS

Chocolate bars contaminated with *Salmonella napoli*: an infectivity study

Before 1982 the isolation of *Salmonella napoli* from human sources was very rare in the United Kingdom. Between April and mid-September 1982, 245 laboratory reports of *S napoli* isolations had been recorded (PHLS Epidemiological Diseases Surveillance Centre, unpublished data). Epidemiological investigation showed a strong association with the consumption of chocolate bars manufactured in northern Italy, and on 23 July 1982 the Department of Health and Social Security issued a press release warning the public not to eat Tommy Junior or Rocky Junior chocolate bars.

As a consequence of this publicity a box of Rocky Junior milk chocolate bars was surrendered voluntarily by a market stallholder. The retailer was also the source of Rocky Junior bars which had been eaten by two local patients suffering from *S napoli* infection. *S napoli* was isolated from some of the bars. Preliminary investigations suggested that the number of salmonellae present in each chocolate bar was very small. As chocolate is a microbiologically stable product we decided to attempt to establish the probable infective dose by examining individual chocolate bars for *S napoli*.

Methods and results

Six chocolate bars from each of eight packets of Rocky Junior chocolate bars were examined. Each bar was weighed and homogenised in sufficient 1% peptone water to form a 1/10 dilution. Volumes of 10 ml, 1 ml, and 0.1 ml of this homogenate were added to three tubes each of selenite broth. After incubation and subculture of the homogenates and selenite broths on to selective agar media the presence of *S napoli* was confirmed serologically by slide agglutination. The most probable number of *S napoli* per 10 g of each chocolate bar was estimated using tables.¹

S napoli was isolated from 42 of the 48 Rocky Junior chocolate bars examined. The table shows the most probable number of *S napoli* per 10 g of each chocolate bar. The results indicate an average of 1.6 *S napoli* organisms per gram. The mean weight of the individual bars was 16.0 g (range 12.3–18.4 g). Of the 42 bars containing salmonellae, 28 contained fewer than 10 *S napoli* and 12 contained 10–40 *S napoli*.

Most probable number of *Salmonella napoli* per 10 g of each chocolate bar

Bar	Packet No							
	1	2	3	4	5	6	7	8
A	15	4	ND	4	23	+	9	23
B	240	4	3	4	9	+	+	7
C	15	ND	3	4	4	4	7	9
D	15	ND	4	+	3	4	4	3
E	23	+	4	ND	+	4	3	15
F	43	+	4	ND	3	ND	+	4

ND = Not detected.

+ = Detected in peptone homogenate only.

Comment

Immediately after the press release *S napoli* was isolated from a boy aged 10 who had eaten two Rocky Junior bars on each of two consecutive days. His brother, aged 13, and his mother had also eaten two bars each on one day only but did not have symptoms. Examination of faecal specimens showed that the brother was also excreting *S napoli*.

Theoretically it requires only one viable salmonella bacterium to reach the small intestine and begin its rapid multiplication to initiate symptoms. In practice large numbers of salmonellae may be ingested without untoward effect. Studies using spray dried contaminated egg² suggested that in normal healthy people 10^6 salmonellae may be required to produce symptoms. Investigations after an outbreak of *S eastbourne* infection due to contaminated chocolate³ suggested that an inoculum of as few as 1000 organisms was enough to cause illness.

Gastric acidity plays an important part in killing the organisms before they have had an opportunity to colonise the lower gastrointestinal tract. Virulence also plays a part. Evidence suggests that

milk chocolate confers some protection on the salmonellae, allowing long term survival in the product and resistance to gastric acidity.^{4,5}

An estimate based on the average value of 1.6 *S napoli* organisms per gram of chocolate bar obtained in this study suggests that the infective dose for our patients was roughly 50 organisms. This is considerably lower than those previously suggested as necessary to cause salmonellosis in otherwise healthy people.

¹ Jacobs MB, Gerstein MJ. *Handbook of microbiology*. Princeton, NJ: van Nostrand Company, Inc, 1960.

² McCullough NB, Eisele CW. Experimental human salmonellosis. *J Infect Dis* 1951;88:278–9.

³ Craven PC, Mackel DC, Bairie WB, et al. International outbreaks of *Salmonella eastbourne* infection. *Lancet* 1975;i:788–93.

⁴ D'Aoust JY. *Salmonella* and the chocolate industry. A review. *Journal of Food Protection* 1977;40:718–27.

⁵ Tamminga SK, Beumer RR, Kampelmacher EH. Survival of *Salmonella eastbourne* and *Salmonella typhimurium* in chocolate. *J Hyg (Lond)* 1976;76:41–7.

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Infant chlamydial pneumonia

Pneumonia in infancy caused by *Chlamydia trachomatis* has rarely been suspected in Britain,^{1,2} though it is fairly common in the United States of America.³ We report on a patient with typical clinical and laboratory features.

Case report

A 7 week old Negro baby presented in May 1982 with a seven day history of cough that had worsened over the previous 48 hours, when he had become noticeably tachypnoeic. The cough was paroxysmal, suggesting pertussis, but he did not whoop. Until this illness he had been well; he had been born at term in hospital by normal delivery, the birth weight being 3940 g. He had developed sticky eyes shortly after birth, which had been treated with drops of physiological saline. Neither parent had symptoms of sexually transmitted disease. His mother's puerperium had been normal, and there were no previous pregnancies.

Examination showed a quiet baby still trying to feed despite respiratory distress. He was cyanosed with a respiratory rate of 80/min; the chest was hyperexpanded with generalised crackles on auscultation. Apart from a tachycardia of 140 beats/min findings were otherwise normal, and he remained afebrile throughout.

There was an initial leucocytosis of $24.6 \times 10^9/l$ with mild eosinophilia of 3% (0.738), 43% neutrophils, 47% lymphocytes, and 7% monocytes. Six days later the total white cell count was $14.7 \times 10^9/l$ with 10% eosinophilia (1.47). Blood gas analysis disclosed hypoxia: oxygen tension was 6 kPa (45 mm Hg), carbon dioxide tension 5.5 kPa (41 mm Hg), and pH 7.42; the hypoxia slowly improved over four days. Radiography showed diffuse interstitial shadowing with small nodules throughout both lung fields. Per-nasal swabs failed to grow *Bordetella pertussis*. Swabs of per-nasal secretions were inoculated, within four hours of collection, on McCoy cells treated with cycloheximide. Cultures were examined by Giemsa staining and at 48 hours showed inclusions typical of chlamydial infection. The table shows results obtained in serum specimens taken a week after the onset of symptoms in the

Serological results (reciprocal titres in microimmunofluorescence test)

Antigen	Infant		Mother
	IgG	IgM	IgG
<i>C trachomatis</i> A-C	64	8	256
<i>C trachomatis</i> D-K	256		6400
Lymphogranuloma venereum 1-3	128	8	256
Herpes simplex virus 1 and 2	0		